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ID 109695

**1.   [5] Consider a relation with following attributes:**

**EmpNo              : Employee Number unique across all employees**

**EmpName         : Employee Name**

**EmpEmail         : Employee Email unique across all employees**

**ProjNo              : Project Number unique across all projects**

**ProjName         : Project Name**

**EmpGrade        : Employee Grade**

**HrlyRate           : Hourly rate of compensation.**

**Employees of the same grade receive the same hourly compensation**

**HrsWorked       : Hours a particular employee worked on a particular project.**

* EmpGrade is like “s/w developer”, “QA tester”, etc. One employee will have only one grade.
* An employee can work on many different projects and a project can have many different employees working on it.

1. **Create this table and some sample data** (either on paper or in SQL Server)**. There must be at least 6 rows. There must be 2 to 4 Employees and 2 to 4 projects. Your submission must show all the rows from this table.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EmpNo** | **EmpName** | **EmpEmail** | **ProjNo** | **ProjName** | **EmpGrade** | **HrlyRate** | **HrsWorked** |
| 1 | yaried | yaredsonj@gamil.com | 2 | Banking System | senior | 50 | 150 |
| 2 | Sali | sali\_simon@gmail.com | 1 | Soccer Managment System | junior | 35 | 160 |
| 3 | Hani | hani@gmail.com | 3 | Library System | professional | 60 | 170 |
| 4 | Samri | samri\_berhane@gamil.com | 2 | Banking System | junior | 35 | 160 |
| 2 | Sali | sali\_simon@gmail.com | 3 | Library System | junior | 35 | 185 |
| 1 | yaried | yaredsonj@gamil.com | 1 | Soccer Managment System | senior | 50 | 170 |

1. **Find all functional dependencies.**

fd1- EmpNo – EmpName

fd2 – EmpNo – EmpEmail

fd3 – EmpNo – EmpGrade

fd4 – ProjNo – ProjName

fd5 – EmpGrade – HrlyRate

fd6 – EmpName – EmpEmail

fd7 – EmpEmail – EmpName

fd8 – (EmpNo, ProjNo) - HrsWorked

fd9 – (EmpNo , ProjNo, EmpGrade) – HrsWoked

1. **Find all Candidate Keys.**

(EmpNo, ProjNo)

(EmpNo , ProjNo, EmpGrade)

1. **Find a Primary Key**

(EmpNo, ProjNo)

1. **Find all partial dependencies.**

fd1- EmpNo – EmpName

fd2 – EmpNo – EmpEmail

fd3 – EmpNo – EmpGrade

fd4 – ProjNo – ProjName

1. **Normalize to 2NF.**

Employee(EmpNo, ProjNo, EmpName, EmpEmail, EmpGrade, HrlyRate, HrsWorked)

Project(ProjNo, ProjName)

1. **Show new tables** (based on the sample data you created in 1 above)**.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **EmpNo** | **ProjNo** | **EmpName** | **EmpEmail** | **EmpGrade** | **HrlyRate** | **HrsWorked** |
| 1 | 1 | yaried | yaredsonj@gamil.com | senior | 50 | 170 |
| 1 | 2 | yaried | yaredsonj@gamil.com | senior | 50 | 150 |
| 2 | 1 | Sali | sali\_simon@gmail.com | junior | 35 | 160 |
| 2 | 3 | Sali | sali\_simon@gmail.com | junior | 35 | 185 |
| 3 | 3 | Hani | hani@gmail.com | professional | 60 | 170 |
| 4 | 2 | Samri | samri\_berhane@gamil.com | junior | 35 | 160 |

|  |  |
| --- | --- |
| **ProjNo** | **ProjName** |
| 1 | Soccer Managment System |
| 2 | Banking System |
| 3 | Library System |

1. **Normalize to 3NF.**

Tansitive Dependency : EmpGrade – HrlyRate

Employee(EmpNo, ProjNo, EmpName, EmpEmail, EmpGrade, HrsWorked)

Project(ProjNo, ProjName)

EmployeeGrade(EmpGrade, HrlyRate)

1. **Show new tables** (based on the sample data you created in 1 above)**.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EmpNo** | **ProjNo** | **EmpName** | **EmpEmail** | **EmpGrade** | **HrsWorked** |
| 1 | 1 | yaried | yaredsonj@gamil.com | senior | 170 |
| 1 | 2 | yaried | yaredsonj@gamil.com | senior | 150 |
| 2 | 1 | Sali | sali\_simon@gmail.com | junior | 160 |
| 2 | 3 | Sali | sali\_simon@gmail.com | junior | 185 |
| 3 | 3 | Hani | hani@gmail.com | professional | 170 |
| 4 | 2 | Samri | samri\_berhane@gamil.com | junior | 160 |

|  |  |
| --- | --- |
| **ProjNo** | **ProjName** |
| 1 | Soccer Managment System |
| 2 | Banking System |
| 3 | Library System |

|  |  |
| --- | --- |
| **EmpGrade** | **HrlyRate** |
| junior | 35 |
| professional | 60 |
| senior | 50 |

1. **With the help of an example, explain why a relation must be in 3NF.**

A Relation must be in a 3NF to avoid data inconsistency. For example if you want to update the hourly rate of Junior Employee’s we need to update three tuples in the Employee table, unless other wise our data will be in inconsistent state.

PROBLEM 2

1. **[5] Solve exercise 14.14 (a, b, c) on page 428 from the course text book (6th edition).**

**A.**

Identify the functional dependencies represented by the attributes shown in the form in Figure 14.18. State any assumptions that you make about the data and the attributes shown in this form

fd1 PatientNo – PatientName

fd2 DrugNo – DrugName

fd3 DrugNo – Discription

fd4 DrugNo – MethodOfAdmin

fd5 DrugnNo – Dosage

fd6 WardNo – WardName

fd7 WardName – WardNo

fd8 (PatientNo, DrugNo) – BedNo, UnityPerDay

fd9 (PatientNo, DrugNo, StartDate) – FinishDate

**B.**

**Frist Normal Form**

WellmeadowsHospital(PatientNo, DrugNo, StartDate, PatientName, DrugName, Discription,

MethodOfAdmin, Dosage, UnityPerDay , FinishDate WardNo, BedNo , WardName)

**Second Normal Form**

**Partial Dependent:**

PatientNo – PatientName

DrugNo – DrugName

DrugNo – Discription

DrugNo – MethodOfAdmin

DrugnNo – Dosage

**Candidate Keys :**

(PatientNo, DrugNo) – BedNo, UnityPerDay

(PatientNo, DrugNo, StartDate) – FinishDate

**Primary key:**

(PatientNo, DrugNo, StartDate) – FinishDate

WellmeadowsHospital(PatientNo, DrugNo, StartDate, UnityPerDay , FinishDate WardNo, BedNo , WardName)

Patient(PatientNo, PatientName)

Drug(DrugNo, DrugName, Discription, MethodOfAdmin, MethodOfAdmin)

**Third Normal Form**

**Transitive Dependent:**

WardNo – WardName

WellmeadowsHospital(PatientNo, DrugNo, StartDate, UnityPerDay , FinishDate, BedNo)

Patient(PatientNo, PatientName)

Drug(DrugNo, DrugName, Discription, MethodOfAdmin, MethodOfAdmin)

Ward(WardNo, WardName)

WellmeadowsHospital

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **PatientNo** | **DrugNo** | **StartDate** | **UnitPerDay** | **FinishDate** | **BedNo** | **WardNo** |
| P10034 | 10223 | 24/03/13 | 50 | 24/04/14 | 84 | ward11 |
| P10045 | 10334 | 24/03/13 | 10 | 17/04/13 | 67 | ward11 |
| P10009 | 10223 | 25/04/14 | 10 | 2/5/15 | 23 | ward09 |

Drug

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DrugNo** | **DrugName** | **Description** | **MethodOFAdmin** | **Dosage** |
| 10223 | Morphine | Pain Killer | Oral | 10mg/ml |
| 10334 | Tetracyclene | Antibiotic | IV | 0.5mg/ml |

Patient Ward

|  |  |
| --- | --- |
| **PatientNo** | **PatientName** |
| P10034 | Robert MacDonald |
| P10045 | Sara Robinson |
| P10009 | Mike Ferrer |

**C.**

WellmeadowsHospital(PatientNo(FK), DrugNo(FK), StartDate, UnityPerDay , FinishDate, WardNo(FK), BedNo)

Patient(PatientNo, PatientName)

Drug(DrugNo, DrugName, Discription, MethodOfAdmin, MethodOfAdmin)

Ward(WardNo, WardName)

|  |  |
| --- | --- |
| **WardNo** | **WardName** |
| Ward11 | Orthopaedic |
| Ward09 | dentist |